**SVKM's**

**D. J. Sanghvi College of Engineering**

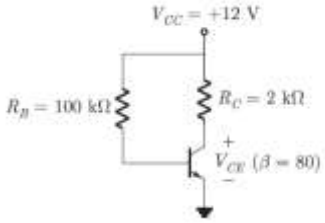
**Program: B.Tech in Electronics & Telecommunication Engineering** **Academic Year: 2022** **Duration: 3 hours**

**Date: 21.01.2023**

**Time: 09:00 am to 12:00 pm**

**Subject: Analog Circuit Design (Semester III)** **Marks: 75**

**Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.**
**(1)** This question paper contains two pages.
**(2) All Questions are Compulsory.**
**(3)** All questions carry equal marks.
**(4) Answer to each new question is to be started on a fresh page.**
**(5) Figures in the brackets on the right indicate full marks.**
**(6) Assume suitable data wherever required, but justify it.**
**(7)** Draw the neat labelled diagrams, wherever necessary.

| Question No. | | Max. Marks |
|---|---|---|
| Q1 (a) | The biasing circuit of a silicon transistor is shown below fig.1. Determine $I_C$, $V_{CE}$ $V_C$ and $V_B$ for the transistor?<br>  <br><br>Fig.1 | [05] |
| | **OR** | |
| Q1 (a) | Draw and explain DC load line of Common emitter amplifier. Why Q point should be at the middle of DC load line and stable ? | [05] |
| Q1 (b) | i. What are the factors that affect the stability of an amplifier?<br>ii. Explain different types of coupling methods used in multistage amplifiers | [05]<br>[05] |

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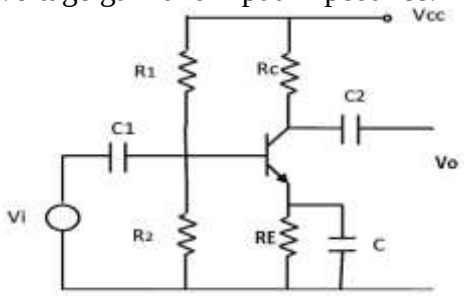
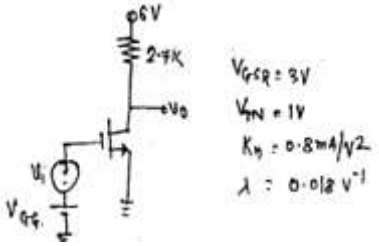
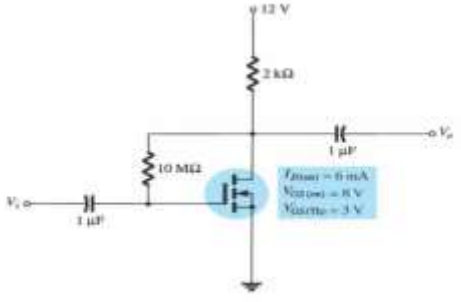
| Q2 (a) | For the given circuit shown in fig.2: the circuit and transistor parameters are: $R_1$=100k, $R_2$=33k, Rc=2k, $R_E$=1k, Vcc=18V, β=200, $V_A$= 100V, $V_{BE}$= 0.7V. Determine<br>i) Q point<br>ii) Hybrid pi model parameters.<br>iii) Small signal voltage gain and input impedance.<br>  <br><br>Fig 2<br>**OR** | [10] |
| Q2 (a) | i) Describe the biasing for MOSFET.<br>ii) For the circuit shown in fig.3 Draw small signal model and Determine gm, $r_o$, Voltage gain, Input impedance and output impedance.<br>  <br><br>Fig.3 | [05]<br>[05] |
| Q2 (b) | Derive expression for Direct coupled Class A power Amplifier | [05] |
| Q3 (a) | i) Compare D-MOSFET with E-MOSFET.<br>ii) Compare Class A, Class B, Class AB & Class C power amplifiers. | [05]<br>[05] |
| Q3 (b) | Explain Wein bridge Oscillator with its advantages and disadvantages.<br>**OR** | [05] |
| Q3 (b) | Determine IDQ and VDSQ for the given circuit below fig. 4<br>  <br><br>Fig. 4 | [05] |

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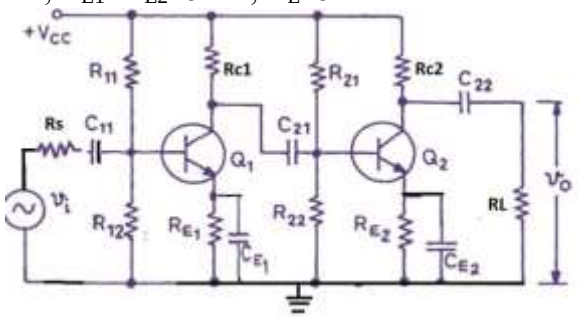
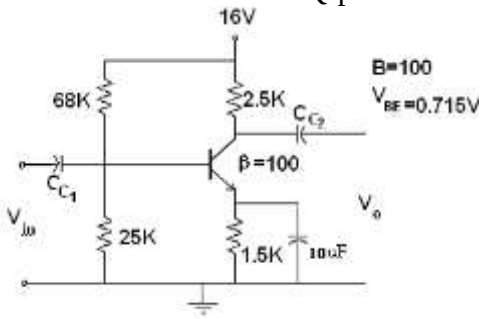
|---|---|---|
| Q4 (a) | Calculate the lower 3db frequency ($f_L$) for the BJT amplifier shown in fig.5 below. Amplifier parameters are: $C\pi1=C\pi2=15pF$, $C\mu1=C\mu2=$ 1pF, $gm1=gm2=50mA/V$, $Rs=100\Omega$, $\beta1=100$, $\beta2=150$, $r\pi1=r\pi2=1.3K\Omega$, $C_{11}=10\mu F$, $C_{21}=5\mu F$, $C_{22}=10\mu F$, $C_{E}1=C_{E2}=50\mu F$, $R_{11}=R_{21}=22K\Omega$, $R_{12}=R22=47K\Omega$, $Rc1=Rc2=8.2K\Omega$, $R_{E1}=R_{E2}=5K\Omega$, $R_L=5K\Omega$.   Fig.5 | [08] |
| | **OR** | |
| Q4 (a) | Draw Cascode amplifier using Bipolar Junction Transistor and derive the expression for Q point, overall voltage gain, input impedance and output impedance. | [08] |
| Q4 (b) | For the circuit shown in fig. 6 determine the $I_{CQ}$, $V_{CEQ}$, $V_E$, $V_C$, $V_B$ and small signal voltage gain. Also plot the DC load line and locate Q-point.   | [07] |
| Q5 (a) | Write a short note on- (Attempt any two.)<br>i) Barkhausen's criteria to sustained oscillation<br>ii) Cross Over Distortion of power amplifier.<br>iii) Darlington emitter follower.<br>iv) Frequency response of RC coupled amplifier. | <br>[05]<br>[05]<br>[05]<br>[05] |
| Q5 (b) | Explain Different topologies of negative feedback amplifiers. | [05] |

All the Best!